# Virginia Injury Update

October 2011

## Fire and Burn Related Injuries in Virginia, 2005-2009

Dear Injury Prevention Advocate,

Fire and burn related injuries can occur in seconds. However, victims can be left with a lifetime of physical and psychological scars. The elderly are most at risk to be fatally injured from a fire or burn with a death rate 17 times higher than those ages 20-24, the age group with the lowest death rate. Children ages four and younger are most at risk for being hospitalized from a burn caused by a hot object/substance. Fortunately, the vast majority of fire and burn related injuries (94%) and deaths (96%) are unintentional in nature and can be prevented with behavioral and environmental modifications. These modifications are simple, inexpensive and easily implemented. Knowledge and behavior changes can not only prevent these types of injuries, but also reduce the severity of injuries if an incident is to occur.

National Fire Prevention Week, October 9-15, 2011, is a good time to raise awareness of the preventability of fire and burn related injuries. The focus of this year's observance is *It's Fire Prevention Week. Protect Your Family from Fire!* For more information about how you can participate, visit the National Fire Protection Association at www.nfpa.org.

This report and previous reports are available for download at www.vahealth.org/prevention.

Thank you for your efforts in preventing injuries in your community.

Sincerely,

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**Introduction**

Burns are one of the most devastating and painful injuries one can sustain. Burn injuries require long rehabilitation and physical therapy. Burn survivors frequently have to deal with a lifetime of physical and psychological trauma[1]. One can sustain a burn injury by numerous mechanisms such as: exposure to fire, hot liquids and objects, chemicals, electrical currents, and extreme cold.

In the United States in 2007, there were 3,774 deaths due to fire- and burn-related injuries and an estimated 410,871 people were treated in U.S. emergency rooms for fire and burn related injuries[2]. It is important to note that most victims of fires die from inhalation of smoke and toxic gases, not burns. However, smoke inhalation injuries are still counted as fire-related deaths and hospitalizations.

For this report, fire- and burn-related deaths and hospitalizations in Virginia were analyzed from 2005-2009. Unintentional fire- and burn-related deaths are analyzed together. This is followed by an analysis of unintentional fire and burn hospitalizations, whereby, fire and burn injuries were analyzed separately by age and gender. Death data were obtained from Vital Records, while hospitalization data were provided by Virginia Health Information, Inc. All rates were calculated using population data from the National Center for Health Statistics.

This report also includes an analysis of causes and types of fires in Virginia, as reported by Virginia Department of Fire Programs. It concludes with a look at fire safety behaviors among Virginians who participated in the Virginia Department of Health's Fire Prevention Program, "Get Alarmed Virginia!".

**A Closer Look at Burn Injuries in Virginia:** An example of a burn injury seen at Virginia Commonwealth University Health Systems.

A 4 year old boy was helping to prepare dinner for himself and his siblings by microwaving a cup of instant soup. When trying to remove the soup from the microwave, he found it too hot to handle and dropped it. The contents spilled over his face, neck, chest and right arm. The boiling liquid instantly produced second and third degree burns. The hot noodles and his shirt stuck to his skin providing further injury. In the emergency room, the child was immediately provided analgesic for pain control and wound care. Child Protective Services was contacted due to the concern of poor supervision or possible neglect. The child was admitted to the burn unit for pain control and initial burn wound care. His ongoing therapy will include further wound management and psychological counseling.

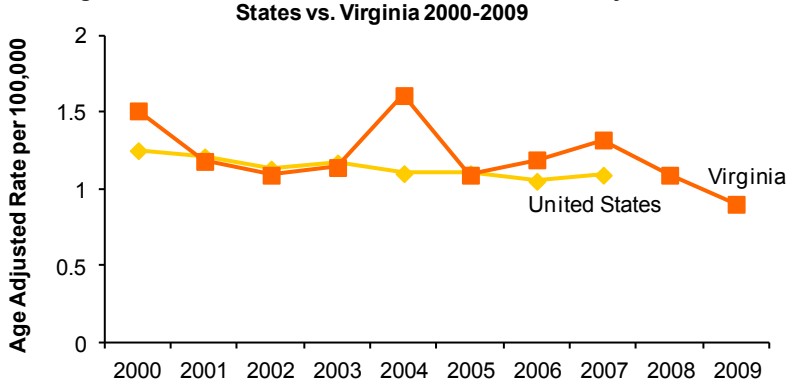
# Virginia Fire and Burn Related Deaths

In Virginia from 2005-2009, there were 452 deaths as a result of a fire- or burn-related injury. Fire- and burn-related injury deaths are overwhelmingly unintentional in nature. Over the five year period, 96% of deaths were unintentional, while 3% were the result of homicide or suicide.

**Unintentional Fire- and Burn-Related Deaths**

There were 434 unintentional fire- and burn-related deaths in Virginia from 2005-2009, for a five year crude rate of 1.13 per 100,000. Comparing age adjusted rates, Virginia's fire/burn-related mortality rates have not been as stable as U.S. rates[2]. U.S. fire/burn rates have declined slightly since 2000 (Figure 1-2007 is the most current year available for national data). Virginia experienced a large spike in fire/burn-related deaths during 2004 and rates have fluctuated since then. Virginia's seven year (2000-2007) unintentional fire/burn death rate was 1.3 per 100,000, which was higher than the national rate of 1.14 per 100,000. Additionally, Virginia ranked 19th out of the 50 states and the District of Columbia for highest fire/burn (age adjusted) death rates. Mississippi had the highest rate at 3.16 per 100,000 and Hawaii had the lowest (0.32/100,000).

**Figure 1. Unintentional Fire and Burn Related Mortality, United States vs. Virginia 2000-2009**

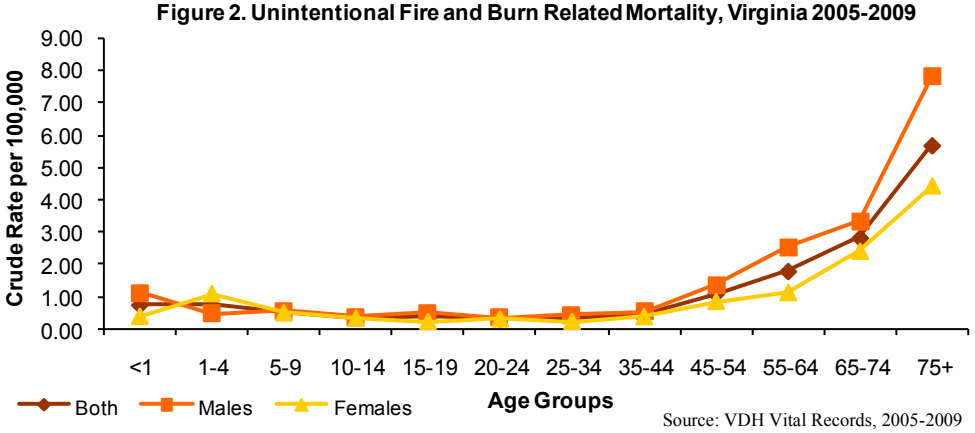



Source: VDH Vital Records, 2000-2009; CDC, WISQARS, 2000-2007

Most burn-related deaths are the result of exposure to fire/flame. During the five year period, 97% of unintentional burn deaths were the result of fire/flame exposure. The remaining 3% were from exposure to a hot object/substance.

Males and minorities have the greatest risk of dying from a fire/burn-related injury. The five-year male death rate (1.3 per 100,000) was higher than the female rate (0.95 per 100,000). The non-Hispanic Black death rate (1.75 per 100,000) was higher than the non-Hispanic White death rate (1.08 per 100,000). There were 10 fire-related deaths to victims of Hispanic ethnicity during the timeframe of this study. However, because rates based on counts less than 20 are considered unstable, rates for this group cannot be compared to the other groups and were not calculated.

**Figure 2. Unintentional Fire and Burn Related Mortality, Virginia 2005-2009**




Source: VDH Vital Records, 2005-2009

According to the National Fire Protection Association, children under 5 years and adults over 65 years have a much higher risk of dying in a fire than the average person[3]. This is true in Virginia as well. Elderly Virginians, ages 75 years and older, were at greatest risk of dying from a fire- or burn-related injury compared to any other age group. The elderly five-year crude death rate was 5.69 per 100,000. This rate was 17 times higher than the 20-24 year old age group, which experienced the lowest rate of all the age groups.

The majority (83%) of unintentional fire-related deaths were due to uncontrolled fires in a house or other type of building. An additional 22% of deaths were due to the ignition or melting of clothing or apparel. Three out of four deaths associated with the ignition of clothing were to elderly Virginians, ages 75 years and older. Among those who died as a result of a burn from a hot substance, 45% were due to contact with hot tap water or hot food, drink or cooking oil.

# Virginia Burn Hospitalizations

From 2005-2009, there were 3,038 hospitalizations related to fire and burn injuries. The crude five year rate was 7.88 per 100,000. Exposure to a hot object/substance accounted for 60.5% of burn hospitalizations, while the remaining 39.5% of burn hospitalizations were the result of exposure to fire/flame. Of these hospitalizations, 94% were considered unintentional and 3.5% were classified as self-inflicted.

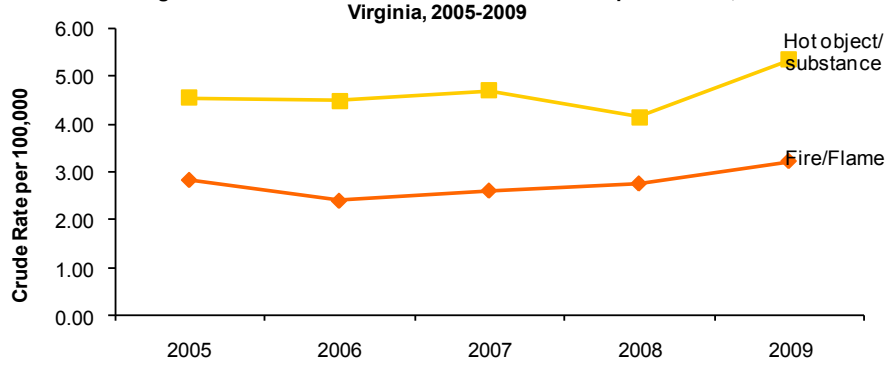
It is important to remember that data in this section represent discharges, not individuals. One individual may have been admitted and discharged from a hospital on several occasions throughout the period of study. Also, hospitalization data do not include fire or burn injuries that were treated by Emergency Medical Services, emergency departments, primary care physicians, or in the home and as such, may under-represent the true burden experienced by Virginians.

**Unintentional Fire and Burn Hospitalizations**

There were 2,861 unintentional fire- and burn-related hospitalizations in Virginia from 2005-2009. The five-year crude rate was 7.4 per 100,000.

Three out of five unintentional fire and burn hospitalizations were from exposure to a hot object/substance. As seen in Figure 3, hot object/ substance injury rates were higher than fire/flame injuries across all five years of the study. Fire/flame hospitalization rates increased between 2006 and 2009. Hospitalizations due to hot object/substance rates decreased from 2007-2008, but then increased again in 2009, to the highest rate observed during this 5-year time period.

**Figure 3. Unintentional Fire and Burn Related Hospitalizations, Virginia, 2005-2009**




Source: VHI, Inc, patient level database, 2005-2009

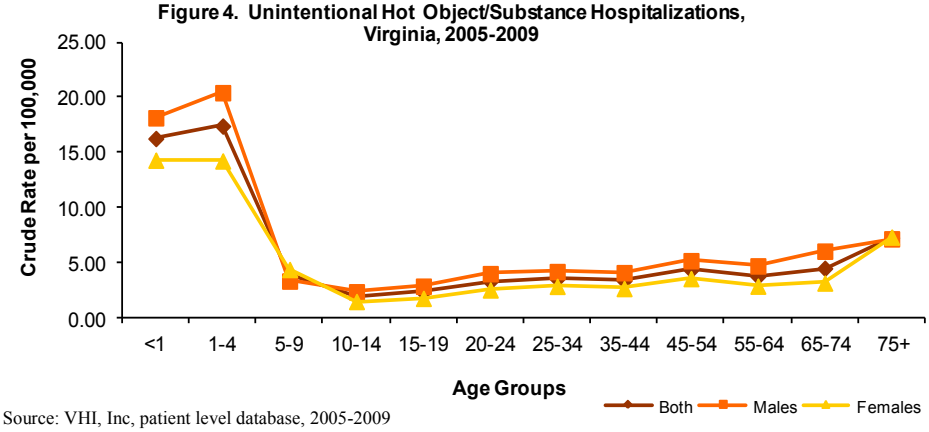
**Hot Object /Substance Hospitalizations**

Injury hospitalizations due to hot object/substances accounted for 60% of all unintentional fire and burn hospitalizations. The majority of burn hospitalizations were scalds caused by hot liquids or vapors (40%), followed by boiling tap water (13%) and exposure to a caustic or corrosive substance (10%).

Males were at greater risk of experiencing a burn injury than females and hospitalization rates were higher among males for all age groups except the 5-9 year age group and those ages 75 years and older. As seen in Figure 4, infants (less than 1 year) and children ages 1-4 years are high risk victims and experienced higher rates of hospitalization than any other age group. Young children have a higher risk of a scald injury because they have thinner skin that burns more quickly as compared to an adult. People of all ages can be burned in 30 seconds by a flowing liquid that is 130° F; at 140° F, it takes only five seconds; at 160° F, it only takes one second. For children under 5, these temperatures can cause a burn in half the time[4].

Scalds were also the most common types of burn-related injuries among children under 5 years. Among infants less than one year, hot tap water accounted for one-fifth of all scald burns, while 16% of burns to children less than 5 years were attributed to hot tap water. These types of injuries are most likely occur in the bathroom[5].

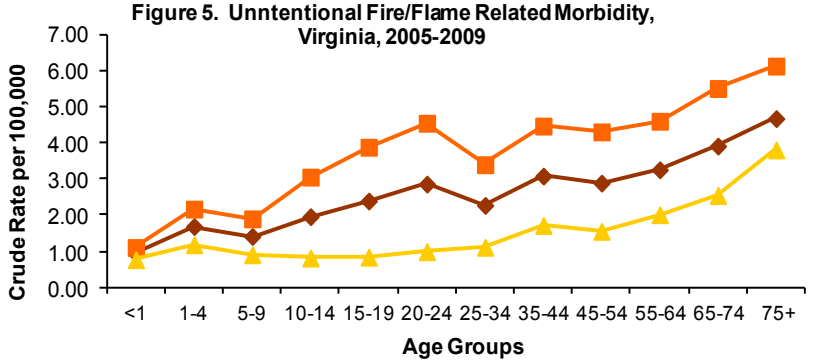
**Figure 4. Unintentional Hot Object/Substance Hospitalizations, Virginia, 2005-2009**




Source: VHI, Inc, patient level database, 2005-2009

### Fire/Flame Related Hospitalizations

Injury hospitalizations due to fire/flames accounted for 37% of all unintentional fire/burn hospitalizations for a five-year crude rate of 2.76 per 100,000. The majority of fire/burn hospitalizations (28%) were attributed to a fire in a private building/dwelling; 11% resulted from a fire not associated with a building. Additionally, 9% of fire burn hospitalizations involved clothing catching fire.



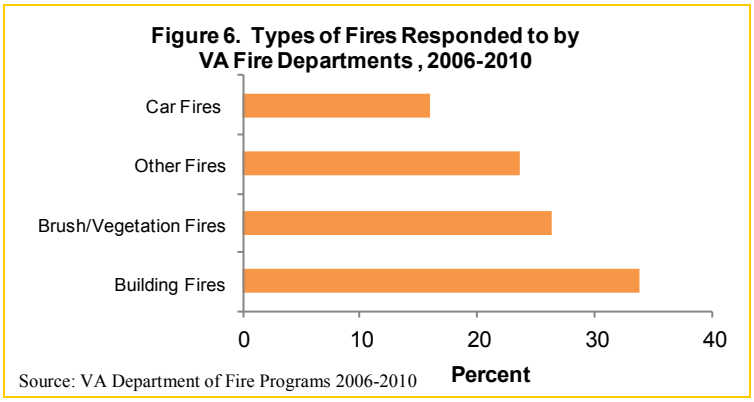

Consistent with death data males were more likely to sustain an fire/flame injury than females. The male hospitalization rate (3.97 per 100,000) was 2.5 times higher than the female hospitalization rate (1.60 per 100,000).

The risk of injury from fire/flame exposure increased with age (Figure 5), placing elderly Virginians at greatest risk for being hospitalized for a fire-related injury. Virginians ages 75 years and older had the highest rate of injury hospitalizations due to fire/flame exposure compared to all other age groups. Among the elderly, 44% of hospitalizations were from fire exposure in a private dwelling. Clothing catching fire was associated with 11% of burn hospitalizations.

Physical and cognitive changes experienced by the elderly place them at higher risk of being injured and dying from a fire[4]. Complications from these changes increase elderly adults' likelihood of starting a fire and decreases their chance of being able to escape a fire. According to the U.S. Fire Administration, the leading causes of fires in which elderly have been injured are: cooking (27%), smoking (19%), and heating (12%)[6].

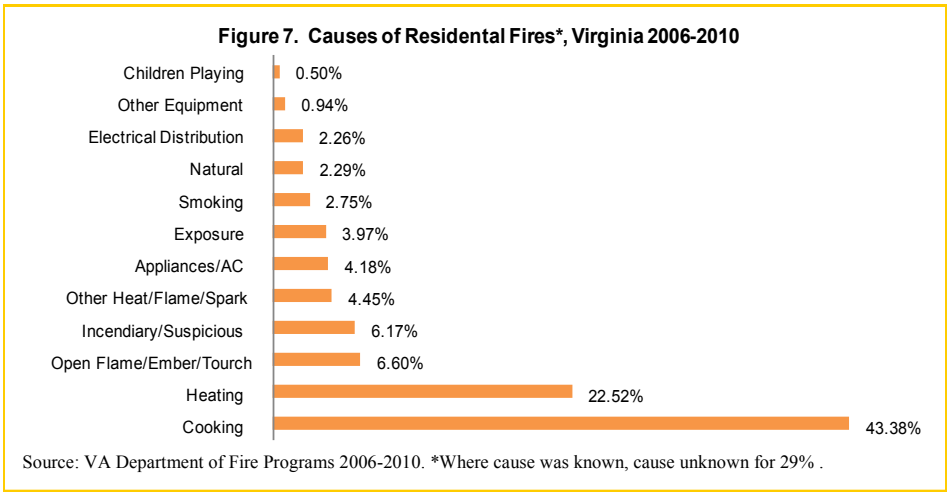
## Fire Response in Virginia 2006-2010 (Virginia Department of Fire Programs)

Between 2006 and 2010, Virginia fire departments responded to an average of 1,800 calls a day. Of these calls, approximately 5% were fire related. Fires, during this time period, were responsible for a total dollar loss of over $1.6 billion. Building fires accounted for the largest proportion of fire-related calls, followed by fires to brush or other natural vegetation.




### Fires to Residential Structures

In 2010, there were 482,000 building fires responded to by fire department in the United States[7]. Between 2006 and 2010, Virginia fire departments responded to over 50,000 building fires, averaging approximately 10,000 fires a year. Of these, slightly more than half (n=29,025) were fires to residential structures. There were 12,591 residential fires attributed to cooking, which was also the leading cause of residential fires. Nearly half of the residential fires, where cause was known, were due to cooking; these fires were responsible for 11% of residential fire deaths and 44% of injuries.




The cause of the fire was unknown for 57% of residential fire-related deaths. Among those where cause was identified, the largest proportion of residential fire deaths were due to incendiary or suspicious nature (31%), followed by smoking (15%).

## Get Alarmed Virginia! Preventing Deaths Due to House Fires in Virginia

The Centers for Disease Control and Prevention funded the Virginia Department of Health from 1998-2011 to coordinate a smoke alarm installation and fire safety education program in high-risk communities in Virginia, including those with high rates of fire death and median household incomes below the poverty level. This program provides funding and technical assistance to local communities to support the following prevention strategies:

- Increasing the number of homes with working smoke alarms
- Increasing the number of residents who plan and practice a fire escape plan
- Increasing the number of residents who test their smoke alarms monthly

Since its implementation, over 50 communities throughout the Commonwealth have benefitted from this project. Over 60,000 smoke alarms have been installed, potentially saving the lives of more than 119 men, women and children and preventing millions of dollars in property loss.

Participant survey results from 2010 indicate that, of homes surveyed, 85% reported having at least one functioning smoke alarm. However, of households that reported having working smoke alarms, installers found non-functioning alarms in 63% of them. Additionally, of the households surveyed, 15% did not have batteries in the smoke alarms.

Before the program, only 17% of participants reported testing their alarms monthly and 34% reported having never tested their alarms. Half of the participating families reported that they had developed a fire escape plan, but only 29% said that they had practiced that plan. In a follow up survey, the number of families reporting that they never test their alarm decreased by 65% and the number reporting that they tested monthly increased by over 200%. The proportion of families with fire escape plans increased to 75%, but the proportion of families that reported practicing their escape plan did not increase.

## References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# PREVENTION TIPS

Fire- and burn-related injuries can be prevented. Up to 75% of scald burn-related injuries among children could be prevented with behavioral and environmental modifications[8]. The risk of fire/burn injuries among children and the elderly can be decreased by following these tips:

**Childhood Fire and Burn Prevention Tips**

In the U.S., fires caused by children's play is the leading cause of residential fire-related death and injury among children ages 9 and under, while the leading cause of burn injuries are scalds (mostly from hot tap water)[8]. The following tips will help prevent childhood fire and burn injuries:

**FIRE**

- Install smoke alarms on every level and in every sleeping area of your home. Test the smoke alarms every month and replace batteries according to the manufacturer's instructions.
- Replace smoke alarms every ten years.
- Keep matches, lighters, gasoline, and other flammable materials locked and out of children's reach.
- Teach children to tell you when they find matches and lighters.
- Avoid dressing children for sleep in loose-fitting, 100 percent cotton garments, i.e. oversized t-shirts.
- Develop and practice a home fire escape plan and designate a meeting place outside.
- Practice fire escape plans with the alarm sounding to ensure children know what it sounds like and are not frightened.
- Demonstrate how to Stop, Drop, and Roll if clothes catch on fire.
- Teach children not to hide from firefighters; but to get out quickly and call for help from another location.

**BURNS**

- Set your water heater thermostat to 120 degrees Fahrenheit or below. Consider installing water faucets and shower heads containing anti-scald technology.
- When giving a child a bath, run cold water into the tub first, then add hot water.
- Use back burners and turn pot handles to the back of the stove when cooking.
- Keep appliance cords out of children's reach, especially if the appliances contain hot foods or liquids.
- When using the microwave, be careful of steam escaping from containers.
- Keep hot foods and liquids away from table and counter edges.
- Never carry or hold children and hot foods or liquids at the same time.
- Cover unused electrical outlets with safety devices.
- Never leave young children alone, especially in the bathroom or kitchen.
- Children should never play with or light fireworks or sparklers.
- Adults who use fireworks should not use them around children.

# PREVENTION TIPS

## Elderly Fire and Burn Prevention Tips

The elderly are at increased risk of hospitalization and death from a fire- or burn-related injury. This risk is largely due to changes in cognitive and physical abilities as one ages. These changes can greatly diminish an elderly adult's ability to hear, feel, and see potential fire and burn dangers[9]. The following tips can help prevent fire- and burn-related injuries among the elderly:

### FIRE

- Install smoke alarms on every level and in every sleeping area of your home. Test the smoke alarms every month and replace batteries according to the manufacturer's instructions.
- Replace smoke alarms every ten years.
- If you have a hearing impairment, install specialized smoke alarms that have a strobe light or work with other in-home notification systems.
- If your clothing catches on fire, Stop, Drop, and Roll.
- Develop and practice a home fire escape plan. Plan your escape around your abilities. Have a telephone in your bedroom and post the local emergency number nearby in case you are trapped by fire.
- Keep glasses, medicines, a telephone, a flashlight and walking aids close to your bed.
- Wet cigarette butts and ashes before emptying ashtrays into a wastebasket.
- Never smoke when lying down, drowsy, or in bed.
- Keep space heaters at least three feet away from anything that can burn. Unplug heaters when they are shut off, you leave your home, or go to bed.
- Wear tight-fitting or rolled-up sleeves when cooking. If a pan of food catches fire, slide a lid over it and turn off the burner.
- Do not cook if you are drowsy from alcohol or medication.
- Do not store or use flammable liquids near furnaces and water heaters.

### BURNS

- Set your water heater thermostat to 120 degrees Fahrenheit or below. Consider installing water faucets and shower heads containing anti-scald technology.
- If you use a wheelchair, place a large, sturdy tray with a sold lip on your lap when moving hot liquids to decrease the risk of lap burns.
- Consider alternate cooking equipment (slow cookers, toaster ovens or microwaves) placed on lower counters or tables if the stove or oven is too high to reach safely.
- Consider the weight of pots and pans. Attempt to move only those items that you can easily handle.
- Place a rubber mat in front of your stove to prevent slipping and falling against the stove.
- All appliance cords need to be kept coiled and away from counter edges. Cords may get caught in cabinet doors, causing hot food and liquids to spill onto you or others.
- Use heat protection devices geared toward protecting those with disabilities such as, microwave dish holders, hot hand protectors and stove monitors.
- Look for and repair electronic outlets that do not work, light switches that are hot to the touch, and lights that flicker.

The Virginia Injury Update has been prepared by the Virginia Department of Health with assistance from the Virginia Department of Fire Programs

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